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COMBINED SCIENCE

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Paper 3 Core Theory

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MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **10** printed pages.

Question	Answer	Marks
1(a)	lines drawn from Enzymes to are biological catalysts ; are usually not active at low temperatures ; are protein molecules ;	3
1(b)	large / insoluble / food <u>molecules</u> are broken down ; into small / soluble molecules / so they can be absorbed ;	2
1(c)	glycogen ; starch ;	2
1(d)(i)	Benedict's (test) ; red colour produced ;	2
1(d)(ii)	no reaction ; because enzymes become inactive at high temperatures ;	2
1(e)	chlorophyll ; light ;	2

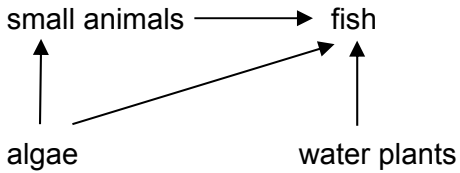
Question	Answer	Marks
2(a)(i)	potassium / K lithium / Li sodium / Na ; ;	2
2(a)(ii)	hydrogen / H ₂ ;	1
2(a)(iii)	turns blue and stays blue / no change ;	1
2(b)(i)	magnesium / Mg ;	1
2(b)(ii)	copper / Cu ;	1
2(b)(iii)	(too) dangerous / (risk of) explosion ;	1
2(c)(i)	resists corrosion / does not rust ;	1
2(c)(ii)	stronger / does not get damaged ;	1

Question	Answer	Marks										
3(a)(i)	<table border="1" data-bbox="846 245 1429 501"> <thead> <tr> <th data-bbox="846 245 1146 296">name of force</th> <th data-bbox="1146 245 1429 296">letter on Fig. 1.1</th> </tr> </thead> <tbody> <tr> <td data-bbox="846 296 1146 347">driving force</td> <td data-bbox="1146 296 1429 347">A</td> </tr> <tr> <td data-bbox="846 347 1146 399">frictional force</td> <td data-bbox="1146 347 1429 399">C</td> </tr> <tr> <td data-bbox="846 399 1146 450">lifting force</td> <td data-bbox="1146 399 1429 450">B</td> </tr> <tr> <td data-bbox="846 450 1146 501">weight</td> <td data-bbox="1146 450 1429 501">D</td> </tr> </tbody> </table> <p data-bbox="539 523 954 555">one mark for each two correct ;;</p>	name of force	letter on Fig. 1.1	driving force	A	frictional force	C	lifting force	B	weight	D	2
name of force	letter on Fig. 1.1											
driving force	A											
frictional force	C											
lifting force	B											
weight	D											
3(a)(ii)	(Force B is 500 000 N) no mark constant height; forces (B and D) are balanced ;	1										
3(a)(iii)	1. A / driving force ; 2. B / lifting force ;	2										
3(b)(i)	$600 \text{ km/h} = 600\,000 / 3600 \text{ m/s} = 167 \text{ m/s}$;	1										
3(b)(ii)	time (= distance / speed) = $2700 / 600 = 4.5 \text{ h}$	1										
3(c)	loss of kinetic energy ; loss of (gravitational) potential energy ;	2										
3(d)	any variation on this shape that goes from the origin to a maximum and returns to speed = 0 ; horizontal section at constant maximum speed ;	2										

Question	Answer	Marks
4(a)(i)	A closes and B opens ;	1
4(a)(ii)	to prevent backflow of blood ;	1
4(b)(i)	any suitable flight or fight situation described ;	1
4(b)(ii)	destroyed by the liver ;	1
4(c)	transport of oxygen / haemoglobin ; transport of blood cells / ions / soluble nutrients / named soluble nutrient / hormones / carbon dioxide ;	2

Question	Answer	Marks
5(a)(i)	Fractional distillation ;	1
5(a)(ii)	no new substance made / involves only changes of state ;	1
5(a)(iii)	cooking / heating allow bottling / bottled gas ;	1
5(b)(i)	methane ;	1
5(b)(ii)	(atoms) five / 5 and (elements) two / 2 ;	1
5(b)(iii)	C atom joined to 4 H atoms by single bonds ; allow correct dot-and-cross diagrams	1
5(c)	coal ;	1

Question	Answer	Marks							
6(a)(i)	conduction ;	1							
6(a)(ii)	insulation (in outer layer of aircraft) / make aircraft out of bad (thermal) conductor / owtte ;	1							
6(b)(i)	(Z – no mark) gas molecules far apart / not touching ;	1							
6(b)(ii)	ice / (frozen) water ; water from fuel combustion freezing / condensing in very cold air ;	2							
6(c)	<table border="1" data-bbox="349 549 1173 628"> <tr> <td data-bbox="349 549 492 628">gamma radiation</td> <td data-bbox="492 549 582 628"></td> <td data-bbox="582 549 663 628"></td> <td data-bbox="663 549 792 628">visible light</td> <td data-bbox="792 549 869 628"></td> <td data-bbox="869 549 1016 628">micro-waves ;</td> <td data-bbox="1016 549 1173 628">radio waves ;</td> </tr> </table>	gamma radiation			visible light		micro-waves ;	radio waves ;	2
gamma radiation			visible light		micro-waves ;	radio waves ;			
6(d)	(pitch) low ; (amplitude) (very) high ;	2							

Question	Answer	Marks
7(a)(i)	for <u>respiration</u> ;	1
7(a)(ii)	diffusion ;	1
7(a)(iii)	from the (water) plants ;	1
7(b)(i)	food web completed as shown ;  arrows in the correct direction ;	2
7(b)(ii)	small animals ; water plants / algae ;	2

Question	Answer	Marks
8(a)(i)	filtration ;	1
8(a)(ii)	kill microbes / sterilise (water) ;	1
8(a)(iii)	(damp)-litmus (paper) ; turns white / bleached ;	2
8(b)(i)	<div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; padding: 5px;">chlorine</div> <div style="font-size: 24px;">+</div> <div style="border: 1px solid black; padding: 5px;">hydrogen</div> <div style="font-size: 24px;">→</div> <div style="border: 1px solid black; padding: 5px;">hydrogen chloride</div> <div style="font-size: 24px;">;</div> </div> <p>LHS either order</p>	1
8(b)(ii)	covalent ; share (pair of) electrons ;	2
8(b)(iii)	HCl ;	1
8(c)(i)	anode ;	1
8(c)(ii)	copper ;	1
8(c)(iii)	copper chloride solution / aqueous copper chloride ;	1

Question	Answer	Marks
9(a)	correct symbols for ammeter and lamp ; correct symbol for variable resistor ; all shown components connected in series, any order ;	3
9(b)	resistance = V / I ; (total resistance) = $2.4 / 0.6$ (= 4Ω) ; resistance of one lamp = 2Ω ;	3
9(c)	(increase – no mark) (total resistance less) so current increases ;	1